CenterLine Pavement Raters Manual

MEASUREMENT RESEARCH CORPORATION
4126 4th Street NW - Gig Harbor, WA 98335
(253) 851-3200 - FAX (253) 851-4334
e-mail mrc@harbornet.com

CenterLine Pavement Raters Manual
Preface

This document originated with a draft manual developed in the early 1990's by over 20 Washington State Local Agencies, through the NWPMS User's Group. Using this draft and over ten years of experience (over 30,000 centerline miles of video and manual surveys) Measurement Research Corporation has refined this original manual to what is presented here. It differs from the current (1999) WSDOT Local Programs rater's manual in a few key areas and includes additional information (See Appendix D for full details). The primary differences include the rating of patching, inclusion of utility patching, differed naming for longitudinal crack types and some differences in how various distresses are quantified and defined. These changes reflect requests made by the original authors (agencies), which were rejected or changed by the WSDOT in their review and publishing process. It also contains rigid distress rating methods and roadside inventory material. If you are using the CenterLine PMS software or if you wish to use your resulting survey to properly model maintenance and repair operations you should use this manual and its related definitions and procedures.

You are free to copy this manual or a copy of this manual is available on request from MRC. A copy is also included in the CenterLine PMS help system in both an Acrobat pdf or word file format. A field (or smaller) version of this manual is also available. You are incur raged to use this manual as written, however, if your agency requires custom modifications or the development of a special rating manual, you are welcome to use this manual as a starting point and modify it and us it as your own. The only requirement is that you give MRC an acknowledgement as to the origin of your manual.

MRC currently provides manual rating services for over 3000 centerline miles each year for Washington State Local Agencies using this manual. This includes both walking and windshield rating surveys.

This manual and/or its procedures are currently in use by several Washington State Local Agencies. This includes the following agencies.

City of Bellevue *	City of Bellingham *	City of Bonney Lake
City of Bremerton	City of Cheney	City of Colville
City of Edgewood	City of Everett *	City of Federal Way *
City of Fife	City of Fircrest	City of Gig Harbor
City of Issaquah	City of Kenmore	City of Kent
City of Kirkland *	City of Lacey	City of Lake Forest Park
City of Lakewood	City of Lynnwood	City of Mountlake Terrace
City of Olympia *	City of Othello	City of Pullman
City of Puyallup	City of Redmond *	City of Renton *
City of Ritzville	City of SeaTac *	City of Seattle *
City of Shoreline	City of Spokane *	City of Sumner
City of Tacoma *	City of University Place	City of Vancouver *
Pierce County *	San Juan County	Spokane County
Snohomish County *		

* These are some of the agencies that were involved in the original development of this manual. Several other agencies not listed here were also involved along with the UW, CRAB, WSDOT and AWC.

CENTERLINE PMS

Pavement Distress Rating Field Manual
Inspection Procedures and Guidelines

These inspection procedures offer a method of determining pavement condition by observing and recording the presence of specific types and severities of defects, or distresses in the pavement surface. The elements of pavement condition rating are as follows:

1. The type of defect.
2. The severity of the defect. How bad is it?
3. The extent to which the road surface is affected by the defect.

There are several types of defects and several possible severities and extents for each defect. These are described and illustrated for flexible and rigid pavements in the following pages of this manual. For more general discussion and details see Appendix A. See Appendix B for the abbreviated field notes. These notes should be carried on your clip board at all times. Appendix C contains information on the roadside inventory and the filling out of the rating forms While Appendix D gives details on how the various pavement scores are computed and a comparison of these different index calculations.

This manual covers both walking/automated and windshield rating procedures.

Walking/Automated Procedures

In general, a walking survey records extent data separately for each distress severity. Extent data is recorded as the actual area, length or count depending on the distress description. Each distress is measured over the full pavement area specified by the individual agency. This is either the full pavement area, a single lane or a small sample unit area (generally >= 10%). It is highly recommended that sample unit procedures not be used and that the full surface area be rated.

Windshield Procedures

A windshield survey is done from within a moving vehicle by having an individual observe the pavement, (generally a single lane), while driving at about 10 to 15 mph. The individual distress severity is defined by the single predominate severity and extent is grouped into ranges to allow the rater to visually estimate the distress data more easily. The extent data is generally further grouped by rating based on percent of wheel paths in place of actual area or length.

Distress Definitions

The description of the distresses and their associated severities does not change between these two methods. However, the extent is based on discrete ranges and wheel path percentages and the predominate severity for the windshield method. While actual areas, lengths and counts and all three severities are recorded when using a walking distress survey. See Appendix B for a detailed breakdown of the walking and windshield severity and extent descriptions and quantifications for both rigid and flexible pavements.

Flexible Pavement Distresses

1. Rutting and Wear

Rutting is a surface depression within the wheel path. Rutting results from a permanent deformation in any of the pavement layers or sub-grade materials. It is usually caused by consolidation or lateral movement of the materials due to traffic loads. When the upper pavement layers are severely rutted, the pavement along the edges of the rutted area may be raised. Usually, the rutting occurs gradually across the wheel path, reaching a maximum depth in the center of the wheel path. Ruts are most obvious after rainfall when they are full of water. Wear is surface depression in the wheel path resulting from tire abrasion. No differentiation is made between rutting and wear.

Severity: Is defined as the maximum depth of an individual rut measurement, general taken at the center of the wheel path.

Extent: The extent of rutting is assumed to be the full length of the segment. Average the rut measurements taken over the full segment length. Use sags & humps for localized rutting (less than 50 to 60% of roadway surface is rutted). If less than ¼ inch do not rate rutting. When using automated equipment, include the maximum value and standard deviation.

Measure: Take measurements in as many locations as is practical and average them or simply visually estimate the average. If estimates are used collect the data to the nearest ¼ inch. Estimates are the preferred method primarily because of traffic hazards and the time involved in collecting the data. Sense the extent is assumed to be 100%, only the single severity level is entered or recorded. Rutting should no be rated if it is not visible with the human eye or if it is less than ¼". Even with specialized equipment you may want to ignore rutting below this level.

2. Fatigue (Alligator) Cracking

Fatigue cracking is associated with wheel loads and is usually limited to areas of repeated traffic loading. The cracks surface initially as a series of parallel longitudinal cracks within the wheel path that progresses with time and loads to a more branched pattern that begins to interconnect. The point at which several discontinuous longitudinal fatigue cracks begin to interconnect is defined as alligator cracking. Eventually the cracks interconnect sufficiently to form many pieces, resembling the pattern of an alligator. On narrow, two lane roads, fatigue cracking may form along the centerline rather than in the customary wheel paths. In parking lots, at intersections and on low volume roads it is common to have fatigue cracking outside of the wheel path.

Almost always, the pattern of the cracking (the longer dimension of the connected cracks) is parallel to the roadway or direction of vehicle travel. However, fatigue cracking occasionally occurs in a pattern transverse to the roadway direction because of poor trench compaction, settlement, or frost action. Pot holes and other occurrences of destroyed or missing pavement are accumulated as high severity alligator cracking and may also be noted in the comment area of the field form.

Severity: Low Multiple branched inner connecting longitudinal discontinuous thin cracks with no spalling. Single and intermittent longitudinal cracks are recorded as the Longitudinal Fatigue Crack distress type, which is a separate distress type.

Medium Cracking is completely interconnected and has fully developed an alligator pattern. Some spalling may appear at the edges of cracks. The cracks may be greater than ¼ - inch wide, but the pavement pieces are still in place.

High The pattern of cracking is well developed. Spalling is very apparent at the crack. Individual pieces may be loosened and may rock under traffic.

Pieces may be missing and appear as though they could be easily removed. Pumping of fines up through the cracks may be evident.

Extent: The extent of alligator cracking is measured in square units or as a percentage or area or wheel path.

Measure The area associated with each separate crack severity should be recorded.

3. Longitudinal Fatigue Cracking

All Longitudinal cracks run roughly parallel to the roadway centerline. Longitudinal cracks associated with the beginning of fatigue (alligator) cracking are generally discontinuous, broken, and occur in the wheel path.

4. Longitudinal Non-Fatigue Cracking

Longitudinal non-fatigue cracks may be caused by a poorly constructed paving joint or from reflective cracks caused by joints and cracks beneath the surface course, including joints and cracks near the edge of the pavement and from underlying PCC slabs. These types of cracks are not load associated. Low severity non fatigue related longitudinal cracking looks very similar to low severity fatigue or alligator cracking; and care needs to be taken to separate these two distresses properly. High severity non-fatigue related longitudinal cracks can exhibit large amount of localized fatigue cracking.

Severity:

Low Cracks have very little or no spalling along the edges and are less than ¼ inch wide.

Medium Cracks have little or no spalling but they are greater than ¼ inch in width. There may be a few randomly spaced low severity connected cracks near the main crack or at the corners of intersecting cracks.

High Cracks are spalled and there may be several randomly spaced cracks near the main crack or at the corners of intersecting cracks. Pieces are visibly missing along the crack, or the two sides of the crack do not match. For longitudinal fatigue cracks, this longitudinal cracking will eventually form alligator cracking.

Extent: The extent of longitudinal cracking is measured in linear units or as a percentage of segment length for one or both wheel paths.

Measure: The length of each individual crack severity should be recorded. For reflective cracks any associated fatigue cracks can be rated separately or included as high severity longitudinal cracks.

5. Transverse Cracking

Transverse cracks run roughly perpendicular to the roadway centerline. They may be caused by surface shrinkage due to low temperatures, hardening of the asphalt, or cracks in underlying pavement layers such as PCC slabs. They may extend partially or fully across the roadway. Include cracks that may be the first stage of block cracking. Longitudinal non-fatigue cracks and transverse cracks receive the same score reduction and can be mixed or combined for convenience when rating. Non-fatigue or reflective longitudinal cracks and transverse cracks receive the same deducts or score reduction and can be used interchangeably without effecting the final score.

Severity:

Low The cracks have very little or no spalling along the edges and are less than ¼ inch in width. If the cracks are sealed and the width of the crack prior to sealing is invisible, they should be classified as Low Severity, this is true for all sealed cracks.

Medium The cracks have little or no spalling but they are greater than 1/4 inch in width. There may be a few randomly spaced low severity connected cracks near the main crack or at the corners of intersecting cracks.

High Cracks are spalled and there may be several randomly spaced cracks near the main crack or at the corners of intersecting cracks. Pieces are visibly missing along the crack, or the two sides of the crack may not match.

Extent: The extent of transverse cracking is measured in linear units or as counts per unit length.

Measure: The length (or count) for each severity should be recorded. The actual length is preferred.

6. Raveling and (Aging or Weathering)

Raveling and aging are pavement surface deterioration that occurs when aggregate particles are dislodged (raveling) or oxidation causes loss of the asphalt binder (aging); aging is generally associated with raveling. An ACP pavement loses its smooth surface and begins to appear very open and rough like very coarse sandpaper. The severity is rated by the degree of aggregate and binder loss. Rate the overall severity within the segment as the predominate level. This is an extremely important distress especially on low volume roads or roads that are failing for reasons other than structural.

This distress is measured or observed differently depending on whether the road surface is BST or ACP. Care should be exercised when rating chip sealed pavements as they tend to look raveled because of the inherent nature of the chip seal surface. However, raveling in chip sealed pavements (loss of aggregate) actually results in a condition of excess asphalt, and should be rated as raveling (see Flushing /Bleeding).

Severity:

Low The aggregate or binder has started to wear away but has not progressed significantly. The pavement appears only slightly aged and s lightly rough.

Medium The aggregate or binder has worn away and the surface texture is moderately rough and pitted. Loose particles may be present and fine aggregate is partially missing.

High The aggregate and/or binder have worn away significantly, and the surface texture is deeply pitted and very rough. Fine aggregate is essentially missing from the surface, and pitting extends to a depth approaching one half (or more) of the coarse aggregate size.

Extent: The extent of raveling is estimated and expressed relative to the total traveled surface area. The recommended ranges for estimated extent are given below; you may record areas or percentatges.

Localized **1** Localized distressed areas, usually in the wheel paths.

Wheel Path **2** Majority of wheel tracks are affected, but little or none elsewhere.

Entire Lane **3** Most of the lane is affected.

Measure: The extent is generally recorded as 1, 2 or 3. For example 3L would be entered on the form for low level raveling over the full surface area. Record only the predominate severity.

7. Flushing/Bleeding

Flushing and bleeding is indicated by an excess of bituminous material on the pavement surface which presents a shiny, glass-like reflective surface that may become sticky in hot temperatures. Wheel path refers to tire tracking area and may be used to represent the condition of only one wheel track being heavily involved.

This distress is measured or observed differently depending on whether the road surface is BST or ACP. In BST pavements, loss of aggregate (raveling), commonly referred to as "chip loss," leaves the binder exposed. This condition looks like flushing, and is rated as raveling.

Severity:

Low Minor amounts of the aggregate have been covered by excess asphalt but the condition has not progressed s ignificantly.

Medium Significant quantities of the surface aggregate have been covered with excessive asphalt, however, much of the coarse surface aggregate is exposed, even in those areas showing flushing.

High Most of the aggregate is covered by excessive asphalt in the affected area. The area appears wet and is sticky in hot weather.

Extent: The extent of flushing is estimated and expressed relative to the total traveled surface area. The recommended ranges for extent are given below, you may record areas or percentages.

Localized	**1**	Localized distressed areas, usually in the wheel paths.
Wheel Path	**2**	Majority of wheel tracks are affected, but little elsewhere in the lane.
Entire Lane	**3**	Most of the lane is affected.

Measure: The extent is generally recorded as 1, 2 or 3. For example 3L would be entered on the form for low level flushing over the full surface area. Record the predominate severity only.

8 Maintenance Patching & 9. Utility Patching

A patch is an area of pavement that has been replaced or covered with new material to repair the existing pavement or for utility access. A patch is considered a defect no matter how well it is performing. A patched area or adjacent area usually does not perform as well as the original pavement. While appropriately done repairs are an asset rather than a liability to the life of the pavement, the fact that they were required (other than for utility work) usually indicates some failure in the pavement structure. Some roughness is often associated with this distress. In general, a patch is less than a typical rehabilitation in size and less than full pavement length and/or width. Some agencies may have patches as long as the work defined by another agency as rehabilitation. Temporary patches are included in this distress category. If a major portion of the segment has been re-paved, this is not a patch.

Utility cut patches are rated and recorded separately using the same definitions given here. Utility patches can be hard to distinguish from a full depth maintenance patches. However, if you consider the overall condition of the roadway (a maintenance patch is generally associated with a poor pavement), the location of obvious utilities near the patch (water, gas, power or telephone etc.) and your agencies patching practices, you can usually resolve the patch type.

Severity:	**Low**	Patch has little or no distress of any type and no change in ride quality
	Medium	Patch has medium severity distress of any type and/or moderately reduced ride quality
	High	Patch has high severity distress of any type and/or severe reduction in ride quality

Extent: The extent of patching is measured in square units.

Measure: All other distresses (e.g., rutting, raveling, cracking etc.) are recorded within a patch as if the patch does not exist. Rate the quality of the patch separately as to the amount of distress and any related deterioration to ride quality. The PMS software will account for any duplication in the quantification of these distresses. Open cracks around full depth patches should be rated as longitudinal and transverse cracks.

10 Corrugation and Waves

This distress category covers a general form of surface distress, which is not limited to the wheel path, although they may occur in the wheel path. The distress may occur in isolated areas, such as at intersections, or it may occur over a large part of the roadway surface. Corrugations and waves are regularly occurring transverse undulations, in the pavement surface. Corrugations occur as closely spaced ripples, while waves are undulations whose distance from peak to valley is more than 3 feet.

Severity: The severity of corrugation is defined as the maximum vertical deviation from a 10-foot straight edge placed on the pavement parallel to the centerline of the roadway.

Low	1/8 inch to 2 inches per 10 feet.
Medium	2 inches to 4 inches per 10 feet.
High	Over 4 inches per 10 feet.

Extent: The extent of corrugations is expressed in square units and is measured over the entire survey area.

Measure: Record the square units separately for each severity.

11 Sags and Humps

This distress usually occurs in isolated areas of the roadway surface. Sags and humps are localized depressions or elevated areas of the pavement that result from settlement, pavement shoving, displacement due to subgrade swelling, or displacement due to tree roots. Localized rutting, such as at intersections, is recorded as sags and humps. This distress is also a good place to record any distress or condition that does not fully comply with any of the other distresses. If this is the case, care should be taken to record any needed details in the comments section of the rating form.

Severity: The severity of sags or humps is defined as the maximum vertical deviation from a 10 foot straight edge placed on the pavement parallel to the center line of the roadway.

Low	1/8-inch to 2 inches per 10 feet.
Medium	2 inches to 4 inches per 10 feet.
High	Over 4 inches per 10 feet.

Extent: The extent of sags and humps is expressed in square units.

Measure: Record the square units area for each separate severity.

12 Block Cracking

Block cracks divide the pavement surface into nearly rectangular pieces with cracks that intersect at about 90 degrees. Block cracking is caused principally by shrinkage of the asphalt concrete and daily temperature cycling. It is not load-associated, although load can increase the severity of individual cracks. The occurrence of block cracking usually indicates that the asphalt has hardened significantly through aging. Block cracking normally occurs over a large portion of the pavement area including non-traffic areas. However, various fatigue related defects may occur in the same segment. Block cracking always begins as equally spaced transverse cracks at 40 to 60 foot intervals.

Severity: The severity of block cracking is defined by the average size of the blocks.

Low	9 X 9 feet and larger blocks.
Medium	Greater than 5 X 5 feet to 8 X 8 feet blocks.
High	2 X 2 feet to 4 X 4 feet blocks.

Extent: The extent of block cracking is square units or percent of length.

Measure: Measure the typical size of the blocks and select the appropriate severity. Record the unit area.

13 Pavement Edge Conditions

Edge raveling occurs when the pavement edge breaks away from roadways without curbs or paved shoulders. However, edge conditions can still occur with paved shoulders and/or curbs. The crack between the curb or gutter is also included as edge cracking. Edge patching is the repair of this condition. The "lane less than 10 feet" distress indicates that the edge raveling has progressed to the point where the pavement width from the centerline to the outer edge of roadway has been reduced to less than 10 feet.

Severity: The severity of Pavement Edge Condition is defined as follows.

Low **Edge Raveling**
Medium **Edge Patching**
High **Edge Lane Less Than 10 Feet – width to centerline < 10'**

Extent: Actual length of edge failure. If both sides are fully raveled, this would be 200% raveling,

Measure: Accumulate the lengths along the surveyed lane for each type/severity of edge defect as it occurs. This can be recorded/estimated as actual lengths or the percent of length. This results in 2 times the length or 200%.

14 Crack Seal Condition

Rate the condition of any existing crack (or joint) sealant. Crack sealant is generally poured over the surface of existing cracks to prevent water form entering the cracks. Some agencies rout or dig out cracks prior to sealing them. This distress is, in general, an inventory of the existing sealed cracks and is used to manage a crack seal program. Crack seal condition is not used in the score calculations, only for crack seal maintenance management operations.

Severity:
Low Sealant in good to excellent condition.
Medium Hairline cracks in the sealant allowing only a min imal amount of water to pass.
High The sealant is severely cracked (or warn away) and may allow significant quantities of water to pass.

Extent: The extent of crack sealing is quantified as the percent of the total length of the cracks (or joints) in the segment that exhibit the seal condition being measured.

Measure: Estimate percent of the length of cracks and joints that exhibit each severity of seal condition. If you are monitoring this distress, transverse cracking should be measured in length units and not counts. The ratio of sealed crack lengths to actual (sealed + unsealed) cracks (alligator, transverse and longitudinal) should provide a true percentage of sealed cracks for a given section of pavement. When rating crack type distresses, a properly sealed crack is always rated separately as a low severity crack. If the crack seal has failed the crack should be rated using the actual severity if visible or use the crack width within the sealant.

Rigid Pavement Distresses

PORTLAND CEMENT CONCRETE DISTRESSES

For distresses 1 though 6, enter the number of slabs that contain the given distress. Be sure to count the total number of slabs in the segment and include this on the rating form. For blowups (#7) enter the number of occurrences and for the wear (#8) enter the average depth. If two slabs are associated with a single distress, such as faulting or pumping at joints between slabs, be sure to record this only once per slab.

1. Cracking

The cracking defects are irregular breaks that may form transversely, longitudinally, or diagonally within a (PCC) panel. Construction joints, which are straight and obviously formed or cut, are not considered cracks.

Severity:

The severity of the cracking is quantified by the number of cracks in a panel.

Low 1 crack per panel
Medium 2 or 3 cracks per panel

High 4 or more cracks per panel

Extent: Number of slabs with this severity

2. Joint and Crack Spalling

Spalling occurs when fragments break or chip off along the edges of the pavement joints or cracks. These spalls may be large wedges or flakes, or they may be only lost pieces of aggregate.

Severity: The severity of joint and crack spalling is quantified by the typical size of the spalls in the joints and cracks that are spalled.

Low 1/8-in. to 1-in. spalls.

Medium 1-in. to 3-in. spalls.

High Greater than 3-in. spalls.

Extent: Number of slabs with this severity.

3. Pumping and Blowing

Pumping and blowing refers to the ejection of water from underneath the pavement. Cyclic wheel loadings eject water through or along the transverse or longitudinal joints and cracks, or at panel edges. The ejected water also carries fine soil particles, thus eroding the pavement foundation. Pumping is recognized by the visible fine materials left on the dried surface of the roadway and/or shoulder areas. Because pavement rating is not done during wet weather, pumping activity would not generally be observed directly.

Severity: The severity of pumping is quantified by the type and amount of the evidence observed at each joint or crack. Either depression of the shoulder at the joint/crack or stains on the shoulder showing fine subgrade soil particles are evidence of pumping.

Low Slight depression evident, little or no staining.

Medium Moderate depression with obvious staining.

High Severe depression and/or significant staining.

Extent: Number of slabs with this severity.

4. Faulting and Settlement

Faulting and/or settlement occurs when abutting pavements separate vertically at the joints or cracks caused by settling or uplifting. The result is a "step" difference between the adjoining pavement surfaces. Settlement is defined as differences in height between pavements across a longitudinal joint or crack. Generally, faulting will be found as a downward "step" across a transverse joint or crack in the direction of travel.

Severity: The severity of faulting or settlement is quantified by the vertical distance between panels or pavement surfaces.

Low 1/8-in. to 1/4-in. faulting or settlement at joints or cracks.

Medium 1/4-in. to 1/2-in. faulting or settlement at joints or cracks.

High Over 1/2-in. faulting or settlement at joints or cracks.

Extent: Number of slabs with this severity.

5. Patching

Patching is a temporary or semi-permanent replacement of all, or part, of a (PCC) slab with a flexible or rigid pavement material. A new, full size, replacement slab is NOT a patch.

Severity: **Low** Patch is in good condition.

Medium Patch shows slite to moderate distress and ride quality.

High Patch shows severe distress and low ride quality.

Extent: Number of slabs with this severity.

6. Raveling or Scaling

Pavement raveling or scaling is the progressive disintegration of the pavement from the surface downward, or from the edges inward, by the dislodgment of aggregate particles. In severe cases, the surface is very rough and irregular.

Severity: The severity of raveling or scaling is determined from personal judgment on the basis of the following descriptions:

Slight	The aggregate or binder has started to wear away but has not progressed significantly. The pavement appears only slightly aged and slightly rough.
Moderate	The aggregate or binder has worn away and the surface texture is moderately rough and pitted. Loose particles may be present and fine aggregate is partially missing from the surface.
Severe	The aggregate and/or binder have worn away significantly, and the surface texture is deeply pitted and very rough. Fine aggregate is essentially missing from the surface, and pitting extends to a depth approaching one half the coarse aggregate size or greater.

Extent: Number of slabs with this severity.

7. Blowups

Blowups are the shattering or upward bucking of pavement panels at transverse cracks or joints. The occurrence is caused by the expansion of a PCC slab when all available room for expansion has been previously taken and the PCC slab is tightly confined. The defect is seldom, if ever, observed in action, but the evidence is obvious. The rater will most likely find a patch where the blowup happened. Usually the patch will include parts of two or more slabs or even the full slabs which have been removed in adjacent lanes across the whole roadway. Raters must assure themselves that the patching was not for utility work or some other activity. The patch is also included in the patching category.

Severity: **Not defined.**

Extent: The number of occurrences in the segment are counted and recorded.

8. Wear

Wear is a surface depression in the wheel path resulting from tire abrasion (usually studded tires).

Severity: The severity is the average wear (rut) depth in the wheel path for the segment or sample. Automated systems may accurately record mean, maximum, standard deviation, and other useful data. Enter the average visual depth of the wear in the wheel path to the nearest ¼"

Extent: The extent of wear is assumed to be the full length of the segment.

Appendix F

Rating Forms

FLEXIBLE PAVEMENT INSPECTION FORM Sq#

Date: PAVEMENT/SEGMENT DATA Left Right

Str/Sq#:			Sg Length:			Sidewalk Type:		
Str. Name:			Sg Width:			Sidewalk Width:		
From Desc:			Shldr/curb Type			Sidewalk Cond.		
To Desc:			Shldr. Width:			Sidewalk %Comp		
Bus Routes:		Speed	Min. Curb Ht.			Ramped Curb/Fr		
# Casting:		Lanes	StormSys.			Ramped Curb/To		
Pav. Type:		Class	Parking:			Striping:		
Observer:		Exempt	Bike Lanes:			Lighting:		

COMMENTS: (Including bridge, median, lane width and excessive crown information etc.) _____

_____

_____

_____

_____

DISTRESS TYPES		GRAPHIC
1. Rutting & Wear _____	9. Utility Patching (AR)	
2. Alligator/Fatigue Cracking (AR)	10. Corrugations & Wave _____	
3. Long. Crack - Structural (LF)	11. Sags & Humps _____	
4. Long. Crack - Reflective (LF)	12. Block Cracking _____	
5. Transverse Crack (LF)	13a. Edge Raveling Ext. _____	
6. Raveling _____	13b Edge Patching Ext. _____	
7. Flushing _____	14. Crack Seal Condition _____	
8. Maintenance Patching (AR)	15. Ride Quality _____	

.	DISTRESS TYPES							
	2	3	4	5	8	9	13	
Direction								
Fwd								
Rev								
Total L								
Severity M								
Data H								
Previous L								
Rating M								
Data H								

RIGID PAVEMENT INSPECTION FORM

Sq#

Date: PAVEMENT/SEGMENT DATA Left Right

Str/Sq #:			Sg Length:			Sidewalk Type:		
Str. Name:			Sg Width:			Sidewalk Width:		
From Desc:			Shldr/curb Type			Sidewalk Cond.		
To Desc:			Shldr. Width:			Sidewalk %Comp		
Bus Routes:		Speed	Min. Curb Ht.			Ramped Curb/Fr		
# Casting:		Lanes	StormSys.			Ramped Curb/To		
Pav. Type:		Class	Parking:			Striping:		
Observer:		Exempt	Bike Lanes:			Lighting:		

COMMENTS: (Including bridge, median, lane width and excessive crown information etc. here) _____

_____

_____

_____

_____

DISTRESS TYPES		**GRAPHIC**
1. Cracking # of panels	5. Patching # panels	
2. Joint/Crack Spalling # panels	6. Raveling or Scaling # panels	
3. Pumping & Blowing # panels	7. Blowups (enter # of Ocur)_____	
4. Faulting/Settlement # panels	8. Wear: (enter avg depth) _____	

	DISTRESS TYPES – Enter # of Panels						
Fwd	1. Cracking	2. Spalling	3. Pumping	4. Faulting	5. Patching	6. Raveling	# of panels in segment:
Rev	1/panel	1/8' - 1"	slight depr	1/8" - 1/4"	Good		
Low							
	(2 or 3)/pl	1" - 3"	mod dp,slst	1/4" - 1/2"	Fair		
Medium							
	> 3/pl	> 3"	sev. depr/st	> 1/2 "	Poor		
High							
Total L							
Severity M						____blowups	_____panels
Data H							
Previous L							
Rating M							
Data H							

Pierce County FLEXIBLE PAVEMENT INSPECTION FORM
PAVEMENT/SEGMENT DATA

Date: _____ Observer:

On#/Sq #		Sg Lngth:		Latest Rating:	
Street Name:		Sg Width:		Function Class:	
From Desc:		FMP:		Pavement Type:	
To Desc:		TMP:		Surface Type:	

1. Rutting & Wear **L M H**	8. Corrugations & Wave **Yes No**	# of Lanes:	
5. Raveling **Loc Whl Lan**	9. Sags & Humps **Yes No**	Last Maint:	
6. Flushing **Loc Whl Lan**	11. Crack Seal Condition **Yes No**	District\City:	

	2. Alligator			3. Longitudinal			4. Transverse			7. Patching (Chip Seal)	
	Hairline < ¼"	Spalling	Spalling /Pumping	< ¼" wide	> ¼" wide	Spalled	< ¼" wide	> ¼" wide	Spalled		
										10. Edge Condition (Raveling)	
Tot										7.	10.

PAVEMENT/SEGMENT DATA

Date: _____ Observer:

On#/Sq #		Sg Lngth:		Latest Rating:	
Street Name:		Sg Width:		Function Class:	
From Desc:		FMP:		Pavement Type:	
To Desc:		TMP:		Surface Type:	

1. Rutting & Wear **L M H**	8. Corrugations & Wave **Yes No**	# of Lanes:	
5. Raveling **Loc Whl Lan**	9. Sags & Humps **Yes No**	Last Maint:	
6. Flushing **Loc Whl Lan**	11. Crack Seal Condition **Yes No**	District\City:	

	2. Alligator			3. Longitudinal			4. Transverse			7. Patching (Chip Seal)	
	Hairline < ¼"	Spalling	Spalling /Pumping	< ¼" wide	> ¼" wide	Spalled	< ¼" wide	> ¼" wide	Spalled		
										10. Edge Condition (Raveling)	
Tot										7.	10.

FLEXIBLE PAVEMENT INSPECTION FORM Sq# _____

Date: PAVEMENT/SEGMENT DATA Left Right

Str/Sq#:			Sg Length:			Shldr/curb Type			
Str. Name:			Sg Width:			Shldr. Width:			
From Desc:			Striping:			Sidewalk Type:			
To Desc:			Lighting:			Sidewalk Width:			
Bus Routes:		Speed	Bike Lanes:			Sidewalk Cond.			
# Casting:		Lanes	Parking:			Sidewalk %Comp			
Pav. Type:		Class	Curb Ht.			Ramped Curb/Fr			
Observer:		Exempt	StormSys.			Ramped Curb/To			

1. Rutting & Wear _____ 10. Corrugations & Wave _____ 13b Edge Patching Ext. _____%
6. Raveling _____ 11. Sags & Humps _____ 13c Edge Lane < 10' _____%
7. Flushing _____ 13a. Edge Raveling Ext. _____% 14. Crack Seal Condition _____%

	2	3	4	5	8	9	13	
Direction								
Fwd								
Rev								
Total L								
Severity M								
Data H								

Name: From: To:

1. Rutting & Wear _____ 10. Corrugations & Wave _____ 13b Edge Patching Ext. _____%
6. Raveling _____ 11. Sags & Humps _____ 13c Edge Lane < 10' _____%
7. Flushing _____ 13a. Edge Raveling Ext. _____% 14. Crack Seal Condition _____%

	2	3	4	5	8	9	13	
Direction								
Fwd								
Rev								
Total L								
Severity M								
Data H								

Name:			From:			To:		
1. Rutting & Wear _____			10. Corrugations & Wave _____			13b Edge Patching Ext. _____%		
6. Raveling _____			11. Sags & Humps _____			13c Edge Lane < 10' _____%		
7. Flushing _____			13a. Edge Raveling Ext. _____%			14. Crack Seal Condition _____%		

	2	3	4	5	8	9	13	
Direction								
Fwd								
Rev								
Total L								
Severity M								
Data H								

Name:			From:			To:		
1. Rutting & Wear _____			10. Corrugations & Wave _____			13b Edge Patching Ext. _____%		
6. Raveling _____			11. Sags & Humps _____			13c Edge Lane < 10' _____%		
7. Flushing _____			13a. Edge Raveling Ext. _____%			14. Crack Seal Condition _____%		

	2	3	4	5	8	9	13	
Direction								
Fwd								
Rev								
Total L								
Severity M								
Data H								
Previous L								
Rating M								
Data H								

COMMENTS:) _____

_____

_____

_____

Appendix G

Examples of Customized Rating Systems

Pierce County Pavement Rating Method

A Summary of the data collection and distress quantity method performed in Pierce County.

HISTORY OF PAVEMENT RATING

Pierce County uses the accepted NWPMA's method for identifying and collecting distress quantities on the Counties Road System. These methods have been modified slightly to conform to the needs of the Counties Maintenance and Repair Program.

Pierce County has been conducting pavement ratings since 1992. Since that time the method of data collection has not changed. In 1992, we tried to determine the worst lane. Rating crews often changed their rating sample to what they thought was the worst lane in the middle of rating a segment. This approach proved to be a waste of field time. In addition, it was determined through analysis of the rating data that those ratings produced inconsistent results. In 1994 it was decided that in order to have some measure of consistency of ratings over time we should rate the same lane in a predetermined direction for the life of that road.

Listed below is description of the different defect categories that are in use for Pierce Counties annual rating Program. These methods are unique to Pierce County and should not be applied to any other agencies road system without considering the effects that these methods might have on the overall rating.

PAVEMENT DEFECT CATEGORIES

Rutting and Wear: The extent of rutting is assumed to represent the entire length of the segment in the wheel path. The severity of rutting is recorded with a Yes in the Low, Medium, or High category. When the data is transferred to the database, the value of rutting is recorded in the LOW severity category only as either a 1=low, 2=med, or 3=high. Disregard any rutting that is localized or less than 100' in length.

Fatigue (Alligator) Cracking: The extent of alligator cracking is measured as a percent of both wheel paths. Choose the predominant severity level of cracking that best represents the entire segment. Since alligator cracking is a percent wheel path measurement, the overall percentage in that segment could be the same even if the actual area covered by alligator cracking is different. *The wheel path covers ½ of the rated lane therefore it doesn't matter if the physical cracking was 1' wide or 5' wide at the same length. In addition, the whole width of the rated lane would be fully cracked if the actual defect extends to cover 2/3 or more of the total width*. Potholes or other occurrences of missing or destroyed pavement and temporary patching are included with alligator cracking.

Longitudinal Fatigue Cracking: *The extent of Longitudinal cracking is measured as a percentage of segment length for the entire area of the rated lane (including the center or paving joint of the road)*. Choose the predominant severity level of cracking that best represents the entire segment. The percent cracking may exceed 100% of the segment length. *There is no distinction between fatigue and non-fatigue related longitudinal cracking. Included is all cracking around utility structures and curb and gutter seems*.

Transverse Cracking: The extent of transverse cracking is measured as counts per unit length. Choose the predominant severity level of cracking that best represents the entire segment. *Transverse cracks must be at least 2' in length to be considered*.

Raveling and (Aging or Weathering): The extent of raveling is estimated and expressed relative to the total area of the rated lane. *Raveling is only collected on ACP surface roads*. Record the appropriate extent by using LOC, WHL, or LAN in the field that best represents the average condition of the segment.

Flushing/Bleeding: The extent of Flushing/Bleeding is estimated and expressed relative to the total area of the rated lane. Record the same as Raveling. Flushing/Bleeding can occur on both ACP and BST surface pavements.

Maintenance Patching:	The extent of skin (chip seal) patch is measured as a percent of both wheel paths. Skin patching is measured the same as alligator cracking. *Any distresses that exist within the limits of the skin patch are also counted and recorded in the appropriate defect category. Grader, full depth, or utility patching is generally considered an improvement to the pavement condition and therefore not included in this defect category.*
Corrugation and Waves:	*Identify only if the condition exists within the rated segment. Record Corrugation and Waves, on the rating form, with a Y or N. When the data is transferred to the database the value for Corrugation and Waves is a 1 in the low severity level if the condition is present.*
Sags and Humps:	Same as Corrugation and Waves. *Sags and Humps are also used to quantify the existence of defects that do not fit the normal categories such as depressions or tree roots.*
Pavement Edge Condition:	The extent of Edge Raveling is measured as a percentage of the segment length. *When edge raveling exists in combination with alligator cracking both defects are counted.* ***Temporary*** *edge patching is included with alligator cracking. Permanent Edge Patching and Edge Lane Less than 10' are not included in this category.*
Crack Seal Condition:	*This distress is collected for inventory purposes only. Identify if cracks in the segment are sealed or not. Y=sealed and N=not sealed. Choose the predominant condition to determine if the segment has crack seal or not. If crack seal exists in the segment and the seal has opened or pulled away from the crack it is not sealed. Treat the underlying cracks below the seal as if there were no seal at all.*

In the future we are looking at making changes to the way we collect our distress data. Examples of which might be rating 100% of the road surface, separating Fatigue and Non-Fatigue Longitudinal cracking, and measuring the actual area of distress.

Spokane County Rating Procedures

Spokane Counties rating procedures follow the Pavement Surface Condition Rating Manual. The only deviation from this standard of rating comes from the actual square footage rating of alligator and patching.

Alligator: **Alligator cracking is rated across the full lane width, predominant severity is recorded in square footage of occurrence. Potholes are recorded as high alligator for the affected area.**

1994-1997: Rated in linear feet, calculated as follows;
((length of alligator-linear ft./ (length of segment*2))*100
Entered into system as a percentage.

1998-1999: Rated in square feet, calculated as follows:
(length * width) = square feet of distress
Entered into system as square footage of distress

Longitudinal: **Measure the total length of all cracking that occurs in traveled lane. The predominant severity is recorded in linear feet. Cracks on the centerline of the road, and cracks not within 6" of the fog line, or acp edge, are counted.**

1994-1997 : Rated in linear feet calculated as follows:
((length of longitudinal cracking in linear ft./length of segment)*100)

Entered into system as a percentage

1998-1999: Rated in linear feet calculated as follows:
(length) = length of distress
Entered into system as linear feet of distress

Transverse: **Actual Counts of transverse cracks existing in the rated lane for the entire segment. The predominant severity is recorded. Transverse cracks are counted if they extend across one wheel path, and are a minimum of 2 feet in length.**

1994-1997: Rated in counts per 100 feet calculated as follows:
((# Of transverse cracks per segment/5)***(assumes rating segment of 500')
Entered into system as cracks per 100 feet

1998-1999: Rated in actual counts per segment.
Entered into system as counts per segment.

Patching: **All patches are rated, maintenance and utility. The determination of the severity level does not correspond to the Rating Manual. The severity level of the patch is actually determined by the condition of the patch rated, not by the type of patch. Patches are recorded in square feet of occurrence.**

1994-1997: Rated in linear feet, calculated as follows;
((length of patch-linear ft./ (length of segment*2))*100
Entered into system as a percentage.

1998-1999: Rated in square feet, calculated as follows:
(length * width) = square feet of distress
Entered into system as square footage of distress

Edge Condition: Measure the predominant severity of distress in linear feet. Severity levels correspond to Standard Rating Procedures.

1994-1997: Rated in linear feet, calculated as follows; ((length of edge condition in linear feet/ length of segment)*100 Entered into system as a percentage.

1998-1999: Rated in linear feet, calculated as follows: length of edge condition in linear feet = length of edge condition in linear feet. Entered into system as linear feet.

Rutting: Record the predominant severity that best represents existing roadway condition. Extent is considered to be the full length of the segment.

1994-1997: Rated as a 1-2 or 3, for predominant severity**.**

1998-1999: Rated as a .25", 50" or .75", for predominant severity.

Raveling/Flushing: Record the predominant severity for the distress,
Identify the extent as localized, wheel path, or entire lane. The extent is considered to be the length of the rated segment.

1994-1997: Rated in length of the distress. Entered into system as linear feet of distress.

1998-1999: Rated as a 1-2 or 3, for predominant severity.

Index